

Kai Xu

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Education

Ph.D. in Mathematics, Duke University, Aug 2020 – May 2025 (expected)

Advisor: Hubert Bray

B.S. in Mathematics, Peking University, Sep 2016 – Jul 2020

Thesis: “Domination relations in four-dimensional geometries”

Supervisor: Yi Liu

Publications and preprints

1. *Inverse mean curvature flow with outer obstacle*
Preprint (2024), [arxiv:2405.15181](https://arxiv.org/abs/2405.15181), submitted.
 2. *New spectral Bishop-Gromov and Bonnet-Myers theorems and applications to isoperimetry*
Joint with G. Antonelli, preprint (2024), [arxiv:2405.08918](https://arxiv.org/abs/2405.08918), submitted.
 3. *Scalar curvature and volume entropy of hyperbolic 3-manifolds*
Joint with D. Kazaras, A. Song, preprint (2023), [arxiv:2312.00138](https://arxiv.org/abs/2312.00138), submitted.
 4. *Drawstrings and flexibility in the Geroch conjecture*
Joint with D. Kazaras, preprint (2023), [arxiv:2309.03756](https://arxiv.org/abs/2309.03756), submitted.
 5. *A topological gap theorem for the π_2 -systole of positive scalar curvature 3-manifolds*
Preprint (2023), [arxiv:2307.01922](https://arxiv.org/abs/2307.01922), accepted by **Duke Math. J.**
 6. *Isoperimetry and the properness of weak inverse mean curvature flow*
Calc. Var. Partial Differential Equations 63, 216 (2024).
 7. *Dimension constraints in some problems involving intermediate curvature*
Preprint (2023), [arxiv:2301.02730](https://arxiv.org/abs/2301.02730), accepted by **Trans. Amer. Math. Soc.**
 8. *On closed surfaces with nonnegative curvature in the spectral sense*
Preprint (2022), [arxiv:2211.11715](https://arxiv.org/abs/2211.11715), submitted.
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Invited talks

1. Apr 2024: Geometric analysis seminar, Peking University / BICMR (online).
2. Apr 2024: Geometry seminar, Michigan State University.
3. Mar 2024: Geometric analysis and topology seminar, New York University / Courant Institute.
4. Mar 2024: Geometry seminar, Chinese University of Hong Kong.

5. Feb 2024: BIRS workshop: “Recent advances in comparison geometry”, IASM Hangzhou, China.
 6. Nov 2023: Geometry and topology seminar, Duke University.
 7. Oct 2023: Geometric analysis seminar, University of Chicago.
 8. Oct 2023: Geometry seminar, Westlake University (online).
 9. Oct 2023: Geometry seminar, Stanford University.
 10. Jul 2023: CUHK-CUNY Compactness and scalar curvature workshop (online).
 11. Oct 2022: Geometry seminar, North Carolina State University.
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Teaching

Fall 2024: Math 333 (complex analysis) & 611 (algebraic topology), grading.
Spring 2024: Math 218D (linear algebra), discussion leader.
Fall 2023: Math 111L (calculus), lab TA.
Spring 2023: Math 111L (calculus), lab TA.
Fall 2022: Math 553 (asymptotic and perturbation methods), 555 (ODE), grading.
Spring 2022: Math 621 (differential geometry) & 411 (topology), grading.
Fall 2021: Math 111L (calculus), lab TA.

Mentoring

Summer 2022: DoMath program at Duke, project manager.

Awards and Fellowships

Oct 2019: Yizheng Alumnus Scholarship
Jun 2019: Scholarship in the Elite Education Program of Pure Mathematics

* Last update: 2024.10.15